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September 16, 1980

2-090-20

Director of Nuclear Reactor Regulation
ATTN: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Arkansas Nuclear One-Unit 2
Docket No. 50-368
License No. NPF-6
Technical Specification Change
Request-Containment Coolers
2-80A-10
(File: 2-151.2)

Gentlemen:

On September 3, 1980, Arkansas Nuclear One -Unit 2 (ANO-2) was shutdown due to inadequate service water flow to the containment cooling units. Flow requirements are shown in ANO-2 Technical Specification 4.6.2.3.a.3.

The containment cooling units (CCU) are required to be demonstrated operable every 31 days. These units had successfully passed all surveillance tests prior to the test which demonstrated inadequate flow and resulted in the recent plant shutdown. The cause of the inadequate flow was subsequently determined to be the result of an intrusion of Asian Clams into the CCUs. These clams grew rather quickly inside the heat exchanger tubes, afixing themselves to the tube walls, thus blocking flow. Attachment 1 is a discussion of the Asian Clams growth cycle and the actions we are taking to prevent further growth and/or intrusion.

Significant effort has been expended in cleaning of the CCUs. This effort, however, has been only partially successful. Flow rates have been increased significantly but not yet to the 2500 gpm limit required by Technical Specification 4.6.2.3.a.3. (Note: The CCUs are arranged in two Groups with two CCUs per Group. Each Group is powered by a different safety grade electrical power source.) Some flow blockage still exists as a result of remaining clams which our efforts have been unsuccessful in removing. Attachment 2 is a discussion of the cleaning efforts that have been undertaken.

As discussed in our letter to you dated September 11, 1980, each CCU is required to have a flow rate of 1250 gpm to obtain maximum performance capability. This, of course, requires a flow rate of 2500 gpm through any Group (containing 2 CCUs) to obtain 1250 gpm through each CCU. Due to the pressure drop across the group and the partially restricted flow, we cannot obtain a flow rate of 2500 gpm through either Group. We can, however, obtain 1250 gpm through a single CCU if the other CCU in the group is isolated.

There is no cleaning procedure known to us that will remove the remaining clams without jeopardizing the integrity of the tube materials. In our opinion, it is necessary to completely disassemble the CCUs for such removal. This activity is projected to take 6 to 8 weeks to complete. Given the unseasonably hot weather we are now experiencing, power generation from ANO-2 is essential to meet our customers needs. Therefore, we desire to continue operation with less than maximum flow until our refueling outage early next year.

We have studied the safety implications of continued operation with reduced flow carefully and believe that the public health and safety will not be endangered by such. Attachment 3 is a safety evaluation addressing this issue.

To allow continued operation, we propose modifications to the ANO-2 Technical Specifications and to the surveillance requirements. Figure 1 is a simplified drawing of the CCUs, service water inlet and outlet and required flow rates. A more detailed P&ID is shown on ANO-2 FSAR Figure 9.2-1 Sht. 2 of 4.

The attached Technical Specification Change Request modifies ANO-2 Technical Specification 3.6.2.3 to allow operation with a minimum of one CCU OPERABLE in each Group and modifies Specification 4.6.2.3.a.3 to specify a surveillance flow requirement of 1250 gpm to each OPERABLE Group.

We request your review and approval of the attached Technical Specification Change Request. As this issue is critical path to start-up of ANO-2 and given our current need for generated power, your most expedited review will be sincerely appreciated.

Pursuant to 10 CFR 170.22, we have determined this to be a Class III amendment. Accordingly, attached is a check in the amount of $4,000.00.

Very truly yours,

William Cavanaugh, III

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Attachments

STATE OF ARKANSAS)
) SS
COUNTY OF PULASKI)

Willam Cavanaugh, III, being duly sworn, states that he is Vice President, Generation & Construction, for Arkansas Power & Light Company; that he is authorized on the part of said Company to sign and file with the Nuclear Regulatory Commission this Supplementary Information; that he has reviewed or caused to have reviewed all of the statements contained in such information, and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information and belief.

William Cavanaugh, III

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for the County and State above named, this 16 day of September, 1980.

Sharon Kaye Hendrix
Notary Public

My Commission Expires:

My Commission Expires 9/1/81

ATTACHMENT 1

ASIAN CLAMS

Asian clams, Corbicula Fluminea, are common mollusks found abundantly in the warm freshwaters of the United States. Adult clams, approximately 1-1 1/2 inches in diameter, reproduce prolifically during the year when water temperatures range from 62 to 75F. Larvae discharged from the adults are about 1/50 of an inch in diameter and are passively carried by water movements. Stagnant, or low flow areas, provide suitable conditions for the larvae to quickly grow into adults.

At ANO-2, service water suction is taken from Lake Dardanelle and is strained before entering the plant. DP measurement is checked on the screens once per shift to prevent buildup of adult clams.

Apparently, during a previous surveillance test of the Containment Cooling Units, Asian clam larvae were present in the service water and were pumped with the water into the Containment Coolers. Upon completion of the Surveillance test, some service water was left stagnent in the coolers. The larvae present apparently found the growth conditions inside the cooling coils quite agreeable and grew very rapidly. This resulted in the reduced flow (flow blockage) evidenced during the last surveillance test.

To preclude future events such as this, we will be taking the following corrective measures:

1) Surveillance testing of the Containment Cooling Units will be increased to a frequency of once per 14 days.

2) During periods of the year when service water temperature is conducive to the production of larvae, (62-75F) we will chlorinate the service water intake and the entire service water loop before performing a surveillance test on the Containment Cooling Units. Chlorination has proved very effective in killing the larvae and is believed appropriate in this case. To assure chlorine is used during the period of larvae production, we will conservatively chlorinate when service water temperature is between 60 and 80F.

We believe the above measures provide adequate assurance this problem either will not reoccur or will be identified rapidly if it should.

ATTACHMENT 2

CONTAINMENT COOLING UNIT CLEANING OPERATIONS

Following the shutdown of ANO-2, several attempts at removing the blockage (clams) from the coolers were made. These efforts, although not completely successful, did substantially reduce the blockage and thus increase flow.

Operations performed included:

1) Backflushing through the cooler tubes.

2) High velocity flushes using compressed air.

3) In accessable portions of the tubes (the tubes make six U bends) wires, etc., were used to remove clams.

4) Chlorine was introduced for several hours followed by more flushing.

5) Chemical cleaning was investigated but was determined to be unacceptable due to possible effects on tube integrity.

The results of these operations substantially reduced blockage and increased flow. Visual examinations of the cooling tube surfaces indicated them to be as clean as new condition. The conclusion of this visual inspection was that no significant heat transfer degradation exists. The effect of the remaining clams in the system is basically one of flow blockage.

Complete removal of the clams will involve complete disassembly of the coolers by cutting the tubes, physically removing the clams and re-welding the tubes. Such an operation would take an estimated 6 to 8 weeks and in addition, problems might be encountered in re-validating the N stamp on the coolers.

ATTACHMENT 3

SAFETY EVALUATION

Currently, ANO-2 is allowed to operate with three Containment Cooling Units (CCUs) OPERABLE. CCUs provide (along with Containment Sprays - CS) an essential safety function by removing heat, and thus reducing pressure in the Containment following a DBA LOCA or MSLB. Pressure in the Containment is important and significant for two distinct reasons: 1) Containment design pressure must not be exceeded to assure Containment integrity is maintained and the accident is contained within at least the third fission product barrier, and 2) Pressure needs to be reduced to as near atmospheric as possible following the accident to minimize leakage through the Containment and thus minimize exposure off-site. Each of these two areas are addressed below.

1. Peak Containment Pressure

a) Current Technical Specification

The current ANO-2 Technical Specification requires two Containment Spray Systems (CSS) OPERABLE and two Containment Cooling Groups with two CCUs in one group and one CCU in the second group OPERABLE. Assuming a most limiting single failure of a diesel generator, equipment remaining in service would be one CSS and one CCU. Our letter of September 11, 1980 provided you the results of the most recent peak containment pressure calculation in this configuration. The peak pressure is calculated to be 52.8 psig vs a containment design pressure of 54 psig and is thus acceptable.

b) Proposed Technical Specification

The proposed Technical Specification Change would allow ANO-2 operation with 2 CSS OPERABLE and 2 Containment Cooling Groups OPERABLE with at least one CCU in each group. Again assuming the most limiting single failure of a Diesel Generator, equipment remaining in service would be one CSS and one CCU or identical to the above case for the existing Technical Specification. Thus Containment Peak Design Pressure would not be exceeded nor would the calculated peak pressure increase above the current calculation.

This information is summarized in the following Table.

	CCU	CS	Single Failure	CCU	CS	SI*	Peak Pressure**
Current T.S.	3	2	DG	1	1	2	52.8 psig
Proposed T.S.	2	2	DG	1	1	2	52.8 psig

* Assuming full Safety Injection Flow (2 trains of SI) is inconsistent with the failure of a Diesel Generator and is thus conservative.

** Bases and code description provided in our letter of September 11, 1980.

2. Reduction of Pressure Post DBA

The rate of cooldown of the containment atmosphere following a DBA affects the rate of pressure decrease inside the containment and thus affects off-site dose due to containment leakage.

In the most limiting case above (failure of a Diesel Generator) containment cooldown rate with the Proposed Technical Specification would be identical to the containment cooldown rate with the current Technical Specification as the same equipment would be operable (i.e., 1 CCU and 1 CSS).

Calculations of off-site dose from containment leakage following a DBA were performed in accordance with Regulatory Guide 1.4 Revision 2. (See ANO-2 FSAR Section 15.1.13-2)

This Regulatory Guide requires using the leakage associated with the peak Containment Pressure, as shown in the Technical Specifications, for the first 24 hours following the DBA and one-half that leakage for the remaining time until the accident is terminated. We have reviewed calculations using the limits in the Proposed Technical Specification and have concluded that containment leakage and, thus, off-site dose is at all times less than the original dose calculations performed in accordance with Regulatory Guide 1.4.

This conclusion is not unexpected as the most limiting condition (failure of a Diesel Generator) with the Proposed Technical Specification is identical to the most limiting condition with the existing Technical Specification.

In addition to the change described above, we also desire to modify Surveillance Requirement 4.6.2.3.a. This specification, approved by your letter of September 12, 1980, requires a service water flow of 2500 gpm to each Group containing two operational cooling units and 1250 gpm to each Group containing one operational cooling unit. The proposed change requires a service water flow of 1250 gpm to each Group regardless of the number of operational CCUs in each Group.

This change is requested for two reasons. First, the analysis discussed above shows that one CCU per Group with a flow rate of 1250 gpm is adequate to mitigate the consequences of a postulated DBA. When two CCUs in a Group are operating, a total service water flow of $\geq$1250 gpm will provide essentially equivalent heat removal capability as compared to 1250 gpm through one cooler. Second, this change will prevent unnecessarily removing one of two operating CCUs from service when service water flow to a Group is between 1250 and 2500 gpm.

Conclusion

As demonstrated above, the Proposed Technical Specification will not jeopardize containment integrity by exceeding the containment design pressure nor will it increase the calculated post DBA Peak Containment Pressure in the most limiting case. Off-site dose consequences as a result of containment leakage post DBA will not exceed the dose projections of the original design basis calculations for ANO-2 and will be identical to projected doses using the existing Technical Specification in the most limiting case.

Thus, the Proposed Technical Specification does not constitute a significant hazard to the health and safety of the public; in the most limiting case, the margin of safety is not reduced; and, a reasonable degree of assurance of safety is maintained.

FIGURE 1